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COMPARATIVE STUDY OF PTERYGIUM SURGERY

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A b s t r a c t: *Aim:* To compare and evaluate the success rates of various surgical techniques of pterygium excision, including pterygium excision with complete suture of conjunctivae (PESC), pterygium excision with conjunctival auto-graft transplantation with graft from the inferior temporal bulbar conjunctiva (ITBC) and pterygium excision with conjunctival auto-graft transplantation with graft from the superior temporal bulbar conjunctiva (STBC).

Material and methods: 120 cases with primary unilateral nasal pterygium were evaluated. Outcomes were evaluated in terms of complication and recurrence after pterygium excision. The patients were divided into 3 groups:

1. Group of 40 patients with primary pterygium (pterygium length over the cornea 1.0 mm and more) treated by the technique of pterygium excision with complete suture of conjunctiva (PESC).

2. Group of 40 patients with primary pterygium (pterygium length over the cornea 1.0 mm and more) treated by the technique of pterygium excision with the conjunctival auto-graft transplantation with graft from the inferior temporal bulbar conjunctivae (ITBC).

3. Group of 40 patients with primary pterygium (pterygium length over the cornea 1.0 mm and more) treated by the technique of pterygium excision with conjunctival auto-graft transplantation with graft from the superior temporal bulbar conjunctivae (STBC).

Results: Mean follow-up time after the surgery was 15 months (6 to 24 months). 12 out of 40 (30%) recurred after the pterygium excision with complete suture of conjunctivae (PESC). Three out of forty (7.5%) pterygium recurred after the modified surgical techniques of pterygium excision with conjunctival auto-graft transplanttation with

graft from the inferior temporal bulbar conjunctiva (ITBC). Five out of forty (10.2%) recurred after the pterygium excision with conjunctival auto-graft transplantation with graft from the superior bulbar conjunctivae (STBC). All the recurrences (8 cases) in both pterygium groups treated by the transplantation procedures were after excision of progressive pterygium when the pterygium reaches more than 3 mm of the corneae. One surgeon performed all 120 surgeries.

Conclusion: A comparison of the groups demonstrated that the recurrence rate was highest in the group without transplantation, using only complete suture of the conjunctiva. The excision of the pterygium with conjunctival auto-graft transplantation from the inferior or superior temporal bulbar conjunctiva are highly efficient in terms of low recurrence rates. The modified surgical technique using the graft from the inferior temporal bulbar conjunctivae is preferred because the superior bulbar conjunctiva is intact for eventual future surgical intervention.

Key words: pterygium, recurrence, primary, conjunctival auto-graft transplantation.

Introduction

Pterygium is an active, invasive, inflammatory process, a key feature of which is focal limbal failure [1]. It is proposed that the initial biological event in pterygium pathogenesis is an alteration of limbal stem cells due to chronic ultraviolet light exposure [2].

The etiology of pterygium still intrigues scientists as a puzzle that is yet to be solved. Davanger and Evanson were the first to postulate that a limbus serves as a generative organ for corneal epithelial cells [3]. The source of corneal epithelial cellular migration and proliferation comes from the peripherial cornea i. e. the limbal niche. This has been extended to clinical application of conjunctival transplantation.

Numerous different techniques exist for the surgical treatment of pterygium but no single approach is universally successful [4]. Pterygium can be easily removed but has a strong tendency to recur [5, 6]. To prevent this, a number of techniques have been described as methods for pterygium treatment, i.e. bare sclera, with or without complete sutures of conjunctiva, conjunctival flaps, conjunctival auto-graft transplantation, amniotic membrane grafts, examer laser application, per – or post excisional radioactive light applications, such as beta radiation, and drug application, such as thiotepa, mitomycin C and 5–fluorouracil (5-Fu) [7]. Although there are numerous surgical techniques that have been described as methods for pterygium treatment and prevention of its recurrence, there are also several attendant complications. Using mytomicin C and 5-Fu in preoperative or post operative periods is one of the alternative methods for the prevention of recurrence, but it was found to be associated with many com-

plications, such as delayed corneal epitelization, sclera ulceration, sclera calcification, necrotizing scleritis, perforation, symblepharon, iridocyclitis, glaucoma, infection and even the loss of the eye [8, 9].

Conjunctival auto-graft transplantation following pterygium excision presents the adventage of reestablishing the structure of the limbus. The limbal niche serves as a generative organ for corneal epithelial cells-stem cells which facilitate corneal epithelial healing [10]. Today conjunctival auto-transplantation is widely used in pterygium surgery, because it is a safe and effective surgical technique with good aesthetic results [11].

Macedonia, a country notable for a high number of sunny days, is also distinctive with a high prevalence of pterygium especially in capable middle aged people, with permanent damage of visual acuity and with a cosmetic insufficiency [12]. For all of the above reasons, as well as the lack of a known effective prophylaxis, pterygium is still a challenge to be examined and solved.

Aim

To compare and evaluate the success rates of various surgical techniques of pterygium excision, including pterygium excision with complete suture of conjunctivae (PESC), pterygium excision with conjunctival auto-graft transplantation with graft from the inferior temporal bulbar conjunctiva (ITBC) and pterygium excision with conjunctival auto-graft transplantation with graft from the superior temporal bulbar conjunctiva (STBC).

Material and methods

120 cases with primary unilateral nasal pterygium were evaluated and operated on the University Eye Clinic in Skopje. The prospective analysis of the patients and cohort randomized study was conducted between January 2003 and December 2010, a period of nearly 8 years. This study was performed in correlation with the standards of the Helsinki declaration of human rights. Outcomes were evaluated in terms of complication and recurrence after pterygium excision. All patients signed a protocol of examination and agreement for the surgical procedure. The patients were not gathered especially for this study but were chosen from among those patients referred to our clinic with pterygium complaints. All cases were operated by one surgeon. The patients were divided into 3 groups:

1. Group of 40 patients with primary pterygium (pterygium length over the cornea 1.0 mm and more) treated by the technique of pterygium excision with complete suture of conjunctiva (EPSC).

2. Group of 40 patients with primary pterygium (pterygium length over the cornea 1.0 mm and more) treated by the technique of pterygium excision with the conjunctival auto-graft transplantation with graft from the inferior temporal bulbar conjunctivae (ITBC).

3. Group of 40 patients with primary pterygium (pterygium length over the cornea 1.0 mm and more) treated by the technique of pterygium excision with conjunctival auto-graft transplantation with graft from the superior temporal bulbar conjunctivae (STBC).

The first 60 patients underwent the EPSC or STBC operation of the pterygium. The other 60 patients underwent STBC or ITBC procedures. The ITBC procedure had not been previously performed by the surgeon and was commended after the preliminary preparation.

The surgical technique of pterygium excision with conjunctival autograft transplantation was performed using topical and subconjunctival anesthesia (sometimes adrenaline was used as well). A rigid lid speculum facilitates maximal exposure. A disposable scarifier Grishaber 681 was used to superficially excise the corneal portion of the pterygium, while the remainder was excised with Wescott scissors following a careful identification and dissection of the extra-ocular muscles. Complete resection of the pterygium body and Tenon's capsulae was performed. The size of exposed bare sclera was measured with calipers, and then the eye was turned up or down to expose the inferior or superior bulbar conjunctiva in order to measure an area of corresponding size and mark the same with metilen blue. The area under the marked space was inflated with lidocaine for easier dissection of the conjunctiva from the Tenon. These marks were included within the margins of the thinly dissected graft tissue in order to facilitate its unequivocal reorientation. The free graft was transferred to its anatomically equivalent position in the recipient bed and secured with approximately eight interrupted sutures of 8–0 vicryl. Postoperatively, topical corticosteroid and antibiotic ointment were administered locally for approximately 4–6 weeks. All cases were outpatients.

Before surgery, the best-corrected Snellen visual acuity, intraocular pressure (by Goldman applanation tonometry), and details of slit lamp and fundus examinations were recorded.

Patients were examined from the first postoperative day, 1st week, 1st month, 3rd month, 9th month and 12th month. After a year the patients were examined twice a year.

The criterion for recurrence was determined to be fibro-vascular tissue invasion of cornea more than 1mm in diameter beginning from the limbus at the operation site [5, 13].

Statistical analysis

All dates of interest for the study were analyzed with the following statistical methods:

– the structure of numerical statistical rank was analyzed with the measurement of central tendency (average) and the measurement of disperse and standard deviation

– the structure of the attributive statistical ranks was analyzed with the help of attitude and proportion

– ANOVA and Tukey HSD tests were used to test the significance between the three arithmetical means

– the χ^2-test and Kruskal-Walis analysis of variation for the distribution less than 5 were used for testing the significance of variation between the three groups of patients

– Nonparametric Mann-Whitney U Test was used for testing the significance of variation between the two groups for the attributive ranks

– The statistical ranks are shown with tables and figures.

Results

In our study we excised the unilateral primary pterygia in 120 patients. Patients were categorized in 3 groups according to the type of operation. 67 male and 53 female patients were included in the study. There are no statistically significant variations between the three monitored groups of patients in terms of their gender. ($\chi^2 = 0.47$ df = 2 p = 0.7893) (Table 1)

Table 1

Patient characteristics

		PESC	ITBC	STBC
Age	**average**	50.0 ± 5.9	48.5 ± 4.4	47.5 ± 7.5
	range	27–73	28–69	30–65
Gender	**male**	24	21	22
	female	16	19	18
Follow-up time	**months**	14.4 ± 5.9	16.6 ± 4.1	15.5 ± 4.7
Time of recurring*	**months**	3.0 ± 2.0	4.0 ± 1.0	5.0 ± 1.5

***** (ANOVA: F = 16.488 p = 0.0012). Between N1(PESC procedure group) and N2 (ITBC procedure group) the differences are significant – Tukey HSD test: p = 0.0310; The differences between N1 (PESC procedure group) and N3 (ITBC procedure group) are significant – Tukey HSD test: p = 0.0001; Between N2 (ITBC procedure group) and N3 (STBC procedure group) the differences are significant – Tukey HSD test: p = 0.0118)

The patients' age ranged between 26 and 72 years and their average age was 47 ± 5.2. There are no statistically significant variances between the three examined groups of patients in terms of their average age. (ANOVA: F = 1.371 p = 0.2708). (Table 1)

Mean follow up time after the surgery was 15 months (6 to 24 months). In respect of follow up time of patients after the surgery, there are not statistically significant differences between the three examined groups (ANOVA: F = 0.828 p = 0.4829). (Table 1)

12 out of 40 pterygia recurred (30%) after their excision with complete suture of conjunctivae (PESC). Recurrences were determined within 1–9 months. Recurrences were diagnosed in patients (8 out of 12–66%) within three months. Average time of recurrence was 3 months ± 2.0. All recurrent pterygia were operated after 6 months using the transplantation technique with a graft from inferior temporal bulbar conjunctiva. No recurrence was noticed.

3 out of 40 pterygia recurred (7.5%) after the modified surgical techniques of pterygium excision with conjunctival auto-graft transplantation with a graft from the inferior temporal bulbar conjunctiva (ITBC). All 3 patients developed recurrences within an average of 4 months ± 1.0.

5 out of 40 pterygia recurred (10.2%) after the pterygium excision with conjunctival auto-graft transplantation with a graft from the superior bulbar conjunctivae (STBC). All 5 patients developed recurrences within the average 5 months ± 1.0.

Recurrences were determined within 1 to 9 months after the pterygium excision. Most of the recurrences were detected after 3 to 5 months. In all three groups, recurrence was higher in middle aged patients, 40–50 years old. (Figure 1).

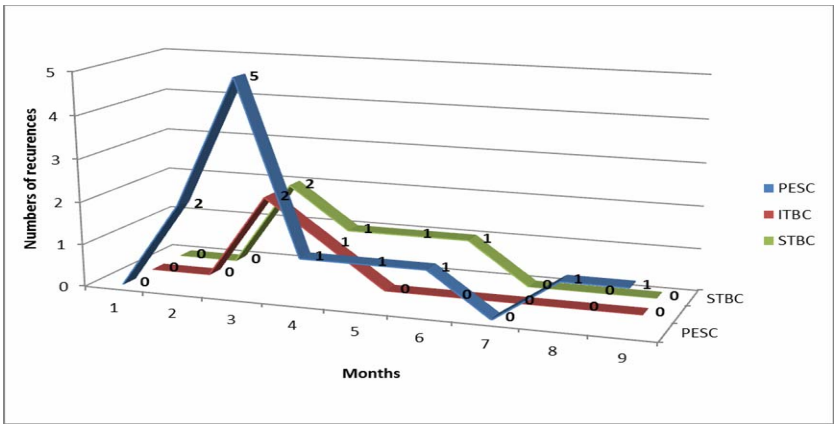


Figure 1 – Distribution of pterygium recurrences

***** (ANOVA: F = 16.488 p = 0.0012). Between N1 (PESC procedure group) and N2 (ITBC procedure group) the differences are significant – Tukey HSD test: p = 0.0310; The differences between N1 (PESC procedure group) and N3 (ITBC procedure group) are signi-

ficant – Tukey HSD test: p = 0.0001; Between N2 (ITBC procedure group) and N3 (STBC procedure group) the differences are significant – Tukey HSD test: p = 0.0118)

Statistically considerable variations appear between the three examined groups of patients in terms of time for pterigium recidivating (ANOVA: F = 16.488 p = 0.0012). Between N1(PESC procedure group) and N2 (ITBC procedure group) the differences are significant for p = 0.0310; The differences between N1(PESC procedure group) and N3 (STBC procedure group) are significant for p = 0.0001; Between N2 (ITBC procedure group) and N3 (STBC procedure group)the differences are significant for p = 0.0118. (Table 1, Figure 1)

A corelation exists between pterigium recidivating and the surgery techniques (Kruskal-Wallis analysis of variation: H = 7.973 p = 0.0186). Mann-Whitney U Test: between N1(PESC procedure group) and N2 (ITBC procedure group) variation is important for Z = 2.561 p = 0.0104; between N1 (PESC procedure group) and N3 (STBC procedure group) variation is significant for Z = 2.015 p = 0.0438; between N2(ITBC procedure group) and N3 (STBC procedure group) variation is not significant Z = -0.740 p = 0.4588. (Table 2)

Table 2

Recurrence after pterygium excision with conjunctival transplantation with graft from PESC, ITBC and STBC

	PESC	**ITBC**	**STBC**
No recurrence	28	37	35
Recurrence	12	3	5

***** (Kruskal-Wallis analysis of variation: H = 7.973 p = 0.0186). Mann-Whitney U Test: between N1 (PESC procedure group) and N2 (ITBC procedure group): Z = 2.561 p = 0.0104; between N1 (PESC procedure group) and N3 (STBC procedure group): Z = 2,015 p = 0.0438; between N2 (ITBC procedure group) and N3 (STBC procedure group): Z = -0, 740 p = 0.4588.)

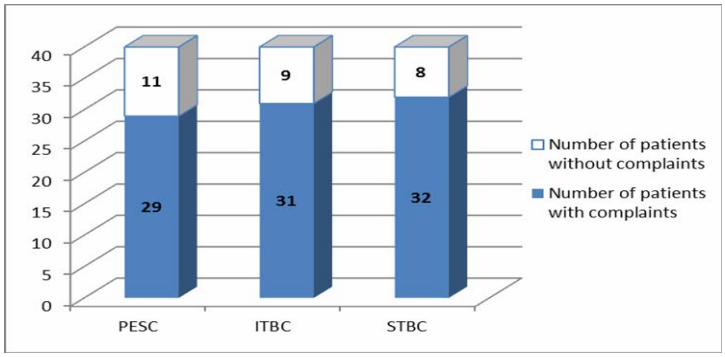
The most common postoperative complaint was irritation or foreign body sensation, followed by wetting, photophobia and blepharospasm. To prevent these complaints postoperatively the eyes were kept shut after the administration of steroids drops and plenty of antibiotic ointment. No statistically significant variations exist between the three monitored groups of patients in respect of the registered early postoperative individual subjective complications (Kruskal-Wallis analysis of variation: H = 4.338 p = 0.1143). There is no correlation between the development of early postoperative individual complications and the surgery techniques ($\chi^2 = 0.65$ df = 2 p = 0.7217). (Table 3, Figure 2)

Table 3

Early postoperative subjective complaints (day after)

	PESC	ITBC	STBC
Wetting	9	8	10
Photophobia	7	2	2
Blepharospasm	6	0	1
Foreign body sensations	7	21	19

(Kruskal-Wallis analysis of variation: H = 4.338 p = 0.1143)



(χ^2 = 0.65 df = 2 p = 0.7217)

Figure 2 – Early postoperative subjective complaints in correlation with the surgical method

Postoperative auto-graft edema was observed in seven patients (17.5%) after the transplantation procedure with the graft of the inferior temporal bulbar conjunctiva (ITBC) and in nine patients (22.5%) after the transplantation procedure with the graft from the superior temporal bulbar conjunctiva (STBC). It was resolved and eliminated within one week by topical corticosteroid administration. (Table 4)

Table 4

Early postoperative complications (day after)

	PESC	ITBC	STBC
Edema	0	7	9
Hyperemia	23	2	1
Haemorragia	1	1	1

***** (Kruskal-Wallis analysis of variation: H = 21.054 p = 0.0001; Mann-Whitney U Test: between N1 (PESC procedure group) and N2 (ITBC procedure group): Z = -3.401 p = 0,00067; between N1 (PESC procedure group) and N3 (STBC procedure group): Z = -3.435 p = 0.00059; between N2 (ITBC procedure group) and N3 (STBC procedure group): Z = -0.135 p = 0.8928)

Other postoperative complications such as graft retraction, corneal dellen, necrosis of the graft, epithelial inclusion cysts, granuloma etc. were not noticed. Only 2 cases had a hemorrhage under the auto-graft. There was no conjunctival scar in the donor area.

After the pterygium excision with complete suture of conjunctivae the most common complaint was hyperemia, which was resolved within first two months. (Table 4)

There are statistically considerable variations between the three groups of patients in the aspect of registered early postoperative objective complications (Kruskal-Wallis analysis of variance: H = 21.054 p = 0.0001). According to Mann-Whitney U Test: between N1 (PESC procedure group) and N2 (ITBC procedure group) variation is important for Z = -3.401 p = 0.00067; between N1 (PESC procedure group) and N3 (STBC procedure group) variation is significant for Z = -3.435 p = 0.00059; between N2 (ITBC procedure group) and N3 (STBC procedure group) variation is significant Z = -0.135 p = 0.8928. (Table 4)

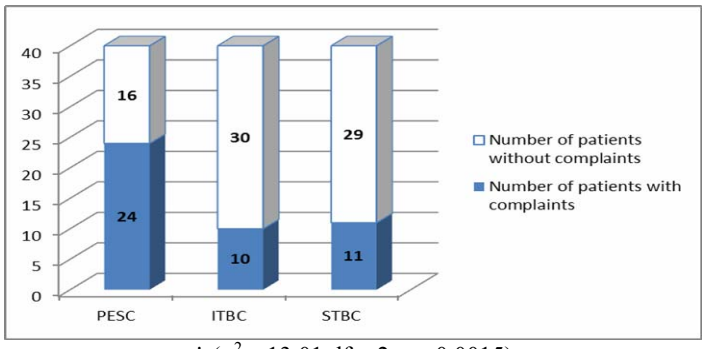
A correlation exists between the development of early postoperative objective complications and the surgery techniques (χ^2 = 13.01 df = 2 p = 0.0015). (Table 5, Figure 3)

Table 5

Early postoperative complications (day after) in correlation with the surgical method

	PESC	**ITBC**	**STBC**
Number of patients with complications	24	10	11
Number of patients without complication	16	30	29
Total number of patients	40	40	40

* (χ^2 = 13.01 df = 2 p = 0.0015)



* (χ^2 = 13.01 df = 2 p = 0.0015)

Figure 3 – Early postoperative complications in correlation with the surgical method

One surgeon performed all 120 surgeries.

Discussion

The recurrence of pterygium after surgical treatment remains a problem. The excision of the pterygium with a complete suture from the conjunctiva has the highest recurrent rate in our study (30%). Also, the recurrence rate is very high in published studies [6, 13]. Recurrences were determined within 1–9 months after surgical treatment. Recurrences were diagnosed in 8 out of 12 (66%) patients within three months, which is shorter than the follow-up period of our study. This technique is not recommended worldwide because it has no advantages other then being simple and time-saving.

This study demonstrates a low recurrence rate of pterygium after excision with conjunctival auto-grafting in area in which the pterygium is prevalent and ultra violet light levels are high [12]. The conjunctival auto-graft technique has excellent efficacy against recurrence within the first year. Only 3 pterygia out of 40 (7.5%) recurred after the modified surgical techniques of pterygium excision with conjunctival auto-graft transplantation with a graft from the inferior temporal bulbar conjunctiva (ITBC).

And only 5 pterigia out of 40 (10.2%) recurred after the pterygium excision with conjunctival auto-graft transplantation with a graft from the superior bulbar conjunctivae (STBC).

All recurrences (8 cases) in both pterygium groups treated by transplantation procedures were within the first postoperative months, (average 5 months), which is shorter than our follow-up time (average 15 months). Generaly, pterygium recurrences occur during the first 6 months [13].

Recurrence rates reported for pterygium excision with conjunctival auto-grafting are generally low (3%–16%). Variations in the results from a given technique may be caused by a number of factors: variation within techniques, the age and geographical location of the population studied, the length of the follow-up time, the interpretation of the definition of recurrence and the experience of the surgeon undergoing the pterygium excision and conjunctival auto-grafting [14]. Recurrence rates reported for pterygium excision with conjunctival auto-grafting are generally low [14–20]. (Tabela 6)

Table 6

Published rates of pterygium recurrence after excision and conjunctival auto-grafting

Author	**Location**	**Numbers**	**Recurrence**
Dowult [17]	Canada	15	8% (1)
Kenyon [16]	Boston	57	5% (3)
Lewallen [14]	St Kitts	19	16% (3)
Singh [18]	Los Angeles	13	8% (1)
Mrzygiot [19]	Poland	41	3% (1)
Koch [20]	Essen	13	8% (1)
Simona [21]	Geneva	14	15% (3)

Those studies describe the STBC procedure. Most surgeons use a graft from the superior temporal bulbar conjunctiva, because of the technical difficulty in harvesting a graft from the inferior temporal bulbar conjunctivae. The superior bulbar conjunctiva is widely exposed for the surgical excision. The inferior limbus and inferior bulbar conjunctivae are more exposed to the deleterious effects of ultraviolet radiation, compared to the superior limbus and superior temporal bulbar conjunctiva which are shielded by the upper lid [21]. Thus inferior limbal grafts may have a lower protective ability than superior grafts.

There are differences in the number of goblet cells in the epithelium of normal superior and inferior bulbar conjunctiva. More often the goblet cells are found in the lower bulbar conjunctiva than in the superior bulbar conjunctiva [22]. The goblet cells discharge secretion mucin which is a part of the tear film. The goblet cell loss is directly related to chronic inflammation and surface cell apoptosis subsequent to cell hyperosmolarity and chronic damage, resulting in further tear film instability/imbalance. For the above reason we prefer using the inferior graft, in order to preserve the goblet cells from the superior bulbar conjunctiva.

Complications resulting from conjunctival auto-grafting are rare and are not a threat to vision, as we can conclude from our study. Postoperative pricking might be minimized using the blind suture or continuous suturing. Also the cosmetic results were found to be superior in both conjunctival auto-grafting techniques with either a graft from the superior or the inferior bulbar conjunctivae.

In some studies of auto-grafting, retrobulbar anesthesia was performed, which is one of the disadvantages of this technique. We did not use retrobulbar anesthesia. However subconjunctival anesthesia did not give transitory paralysis of the motion of the eye bulbous, which we preferred.

The low recurrence rate and rare postoperative complications of the conjunctival auto-transplantation make this procedure one of the most preferred. Conjunctival auto-grafting is a relatively slow procedure, often taking at least 45 min to perform. However, it is still recommended for primary pterygium excision, and for advanced and recurrent pterygium.

Of the two transplantation techniques used in this comparative study with similar recurrence rates and postoperative complications, the conjunctival auto-graft transplantation with a graft from the inferior bulbar conjunctiva is preferred only because we keep intact the superior bulbar conjunctiva for eventual future surgical intervention [21, 23]. ITBC may be the procedure of choice in patients with suspected or proven glaucoma, particularly when the use of mitomycin-C is to be avoided. This surgical procedure can be considered in patients with recurrence after STBC or after a glaucoma operation, also. There are no other comparative studies of the two auto-transplantation techniqus with a graft from the inferior or superior temporal bulbar conjunctiva described in the medical surgery literature.

Conclusion

The excision of pterygium using conjunctival auto-graft transplantation (from both superior and inferior bulbar conjunctivae) is highly efficient in terms of low recurrence rates. We prefer the inferior bulbar conjunctiva for autografting, considering that an auto-graft from the superior bulbar conjunctiva might cause problems in probable filtration surgery. Therefore, it is a recommended technique for pterygium excision in cases with primary, advanced and recurrent pterygium.

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Р е з и м е

КОМПАРАЦИЈА НА РАЗЛИЧНИ ХИРУРШКИ ТЕХНИКИ НА ЕКСЦИЗИЈА НА НАДВОРЕШНО ПЕРДЕ

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А п с т р а к т: *Цел:* Да се спореди и оцени успешноста на различни хируршки техники на ексцизија на надворешно перде, и тоа хируршка ексцизија на надворешно перде со комплетно сутурирање на конјунктивата (ПЕСК), хируршка ексцизија на надворешно перде со конјунктивална автотрансплантација со графт од долно темпоралната конјунктива (ДТКТ) и хируршка ексцизија на надворешно перде со конјунктивална автотрансплантација со графт од горно темпоралната конјунктива (ГТКТ).

Материјал и метод: 120 случаи со примарен едностран птеригиум на назалната булбарна конјунктива, беа разгледувани и оценувани. Евалуацијата беше вршена на основа на постоперативните компликации и постоперативното рецидивирање. Пациентите беа поделени во 3 групи:

1. Група од 40 пациенти со примарен птеригиум (должина на птеригиумот над самата роговица од 1 мм и повеќе) оперирани со техника на екцизија на птеригиум со сутурирање на конјунктивата (ПЕСК).

2. Група од 40 пациенти со примарен птеригиум (должина на птеригиумот над самата роговица од 1 мм и повеќе) оперирани со хируршка ексцизија на надворешно перде со конјунктивална автотрансплантација со графт од долно темпоралната конјунктива (ДТКТ).

3. Група од 40 пациенти со примарен птеригиум (должина на птеригиумот над самата роговица од 1 мм и повеќе) оперирани со хируршка ексцизија на надворешно перде со конјунктивална автотрансплантација со графт од горно темпоралната конјунктива (ГТКТ).

Резултати: Средно време на следење постоперативно беше 15 месеци (6 до 24 месеци). 12 од 40 (30%) птеригиума рецидивираа по екцизија на птеригиум со сутурирање на конјунктивата (ПЕСК). 3 од 40 (7,5%) птеригиума рецидивираа по хируршка ексцизија на надворешно перде со конјунктивална автотрансплантација со графт од долно темпоралната конјунктива (ДТКТ). 5 од 40 (10,2%) птеригиума рецидивираа по хируршка ексцизија на надворешно перде со конјунктивална автотранслплантација со графт од горно темпоралната конјунктива (ГТКТ). Сите рецидиви (8 случаи) во двете групи третирани со трансплантационата проце-

дура беа кај прогресивни птеригиуми кога птеригиумот ја препокрива роговицата повеќе од 3мм. Еден хирург ги изведуваше сите 120 операции.

Заклучок: Преку споредба на групите се забележа дека рецидивите беа најчести во групата без трансплантација, со употреба на комплетно шиење на конјунктивата. Хируршката метода на екцизија на птеригиум со конјунктивална автотрансплантација од долна или горна темпорална булбарна конјунктива е добра хируршка метода со ниска повторувачка честота. Модифицираната хируршка метода со конјунктивална автотрансплантација од долната темпорална конјунктива се препорачува поради зачувување на горната темпорална конјунктива за евентуално идна хируршка интервенција.

Клучни зборови: птеригиум, рецидивантност, примарен, конјунктивална автотрансплантација.

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Table 1

Patients characteristics

		PESC	ITBC	STBC
Age	**average**	50.0 ± 5.9	48.5 ± 4.4	47.5 ± 7.5
	range	27–73	28–69	30–65
Gender	**male**	24	21	22
	female	16	19	18
Follow up time	**months**	14.4 ± 5.9	16.6 ± 4.1	15.5 ± 4.7
Time of recurring*	**months**	3.0±2.0	4.0 ± 1.0	5.0 ± 1.5

***** (ANOVA: F = 16.488 p = 0.0012). Between N1(PESC procedure group) and N2 (ITBC procedure group)the differences are significant – Tukey HSD test: p = 0.0310; The differences between N1(PESC procedure group) and N3 (ITBC procedure group) are significant – Tukey HSD test: p = 0.0001; Between N2 (ITBC procedure group) and N3 (STBC procedure group) the differences are significant – Tukey HSD test: p = 0.0118)

Table 2

Recurrence after pterygium excision with conjunctival transplantation with graft from PESC, ITBC and STBC

	PESC	ITBC	STBC
no recurrence	28	37	35
recurrence	12	3	5

***** (Kruskal-Wallis analysis of variance: H = 7.973 p = 0.0186). Mann-Whitney U Test: between N1 (PESC procedure group) and N2 (ITBC procedure group): Z = 2.561 p = 0.0104; between N1 (PESC procedure group) and N3 (STBC procedure group): Z = 2,015 p = 0.0438; between N2 (ITBC procedure group) and N3 (STBC procedure group): Z = -0, 740 p = 0.4588.)

Table 3

Early postoperative subjective complaints (day after)

	PESC	ITBC	STBC
Wetting	9	8	10
Photophobia	7	2	2
Blepharospasm	6	0	1
Foreign body sensations	7	21	19

(Kruskal-Wallis analysis of variance: H = 4.338 p = 0.1143;)

Table 4

Early postoperative complications (day after)

	PESC	ITBC	STBC
Edema	0	7	9
Hyperemia	23	2	1
Haemorragia	1	1	1

***** (Kruskal-Wallis analysis of variance: H = 21.054 p = 0.0001; Mann-Whitney U Test: between N1 (PESC procedure group) and N2 (ITBC procedure group): Z = -3.401 p = 0,00067; between N1 (PESC procedure group) and N3 (STBC procedure group): Z = -3.435 p = 0.00059; between N2 (ITBC procedure group) and N3 (STBC procedure group): Z = -0.135 p = 0.8928)

Table 5

Early postoperative complications (day after) in correlation with the surgical method

	PESC	ITBC	STBC
Number of patients with complications	24	10	11
Number of patients without complication	16	30	29
Total number of patients	40	40	40

***** (χ^2 = 13.01 df = 2 p = 0.0015).

Table 6

Published rates of pterygium recurrence after excision and conjunctival auto- grafting

Author	Location	Numbers	Recurrence
Dowlut(17)	Canada	15	8% (1)
Kenyon(16)	Boston	57	5% (3)
Lewallen(14)	St Kitts	19	16% (3)
Singh(18)	Los Angeles	13	8% (1)
Mrzygold(19)	Poland	41	3% (1)
Koch(20)	Essen	13	8% (1)
Simona(21)	Geneva	14	15% (3)

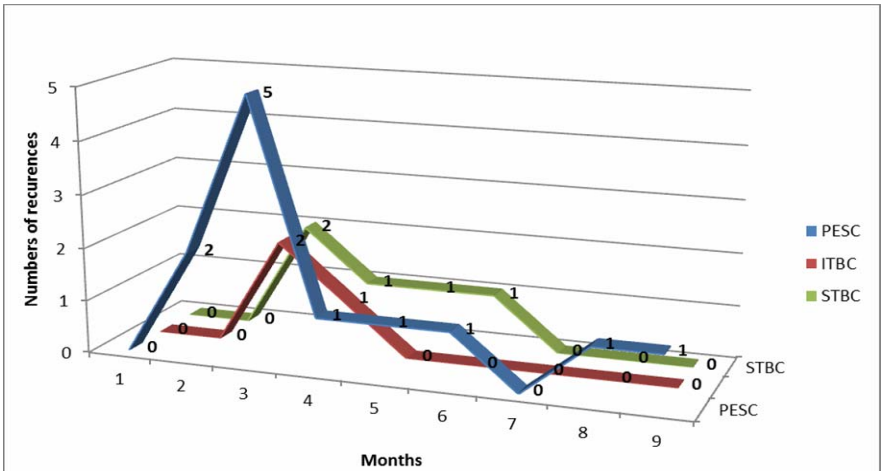
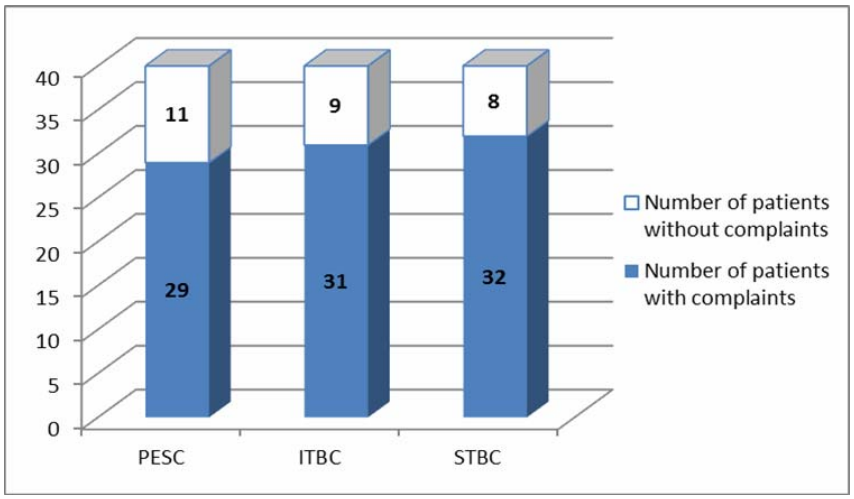


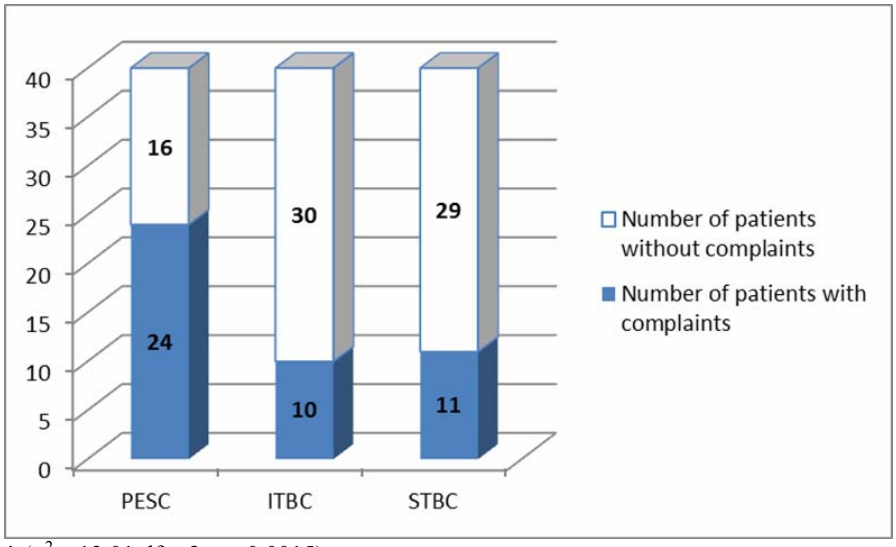
Figure 1 – Distribution of pterygium recurrences

***** (ANOVA: F = 16.488 p = 0.0012). Between N1 (PESC procedure group) and N2 (ITBC procedure group) the differences are significant – Tukey HSD test: p = 0.0310; The differences between N1 (PESC procedure group) and N3 (ITBC procedure group) are significant – Tukey HSD test: p = 0.0001; Between N2 (ITBC procedure group) and N3 (STBC procedure group) the differences are significant – Tukey HSD test: p = 0.0118)

Figure 2 – Early postoperative subjective complaints in correlation with the surgical method



($\chi^2 = 0.65$ df = 2 p = 0.7217)



* ($\chi^2 = 13.01$ df = 2 p = 0.0015).

Figure 3 – Early postoperative complications in correlation with the surgical method